Volume Collapse Transitions in Rare Earth Metals

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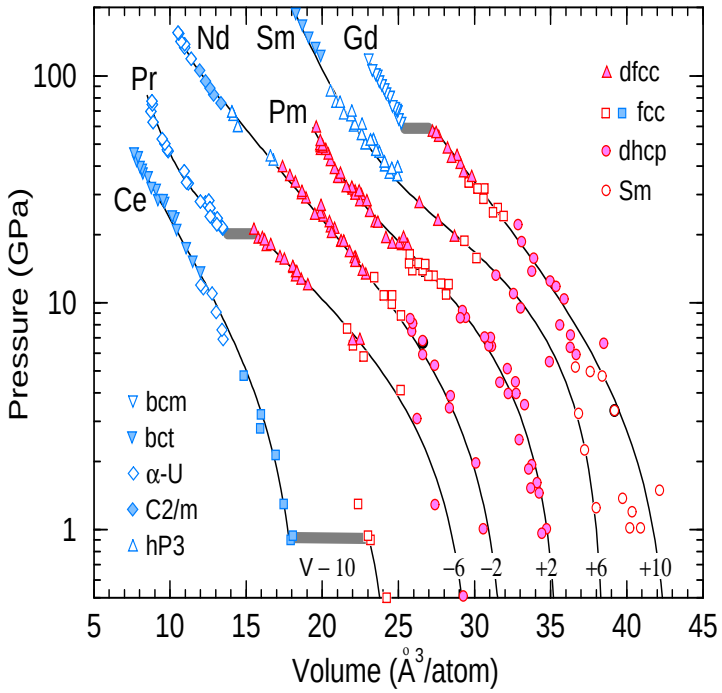

Understanding the response of a solid to pressure has important applications and lends insight into behavior at ambient conditions. Cerium and other rare earths have a fascinating "volume collapse" (flat grey lines in figure at left) as the pressure is increased.

The collapse occurs when the magnetic moments of Cerium atoms are "screened" by conduction electrons. The signature is a shift in the intensity of scattered light from two separated peaks (red) to an intermediate peak (blue) when the pressure is increased. Our theoretical results (solid lines) reproduce experiment (open circles).